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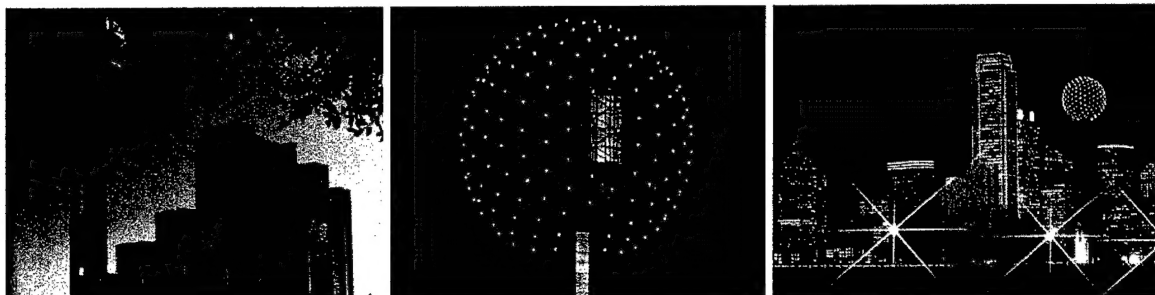
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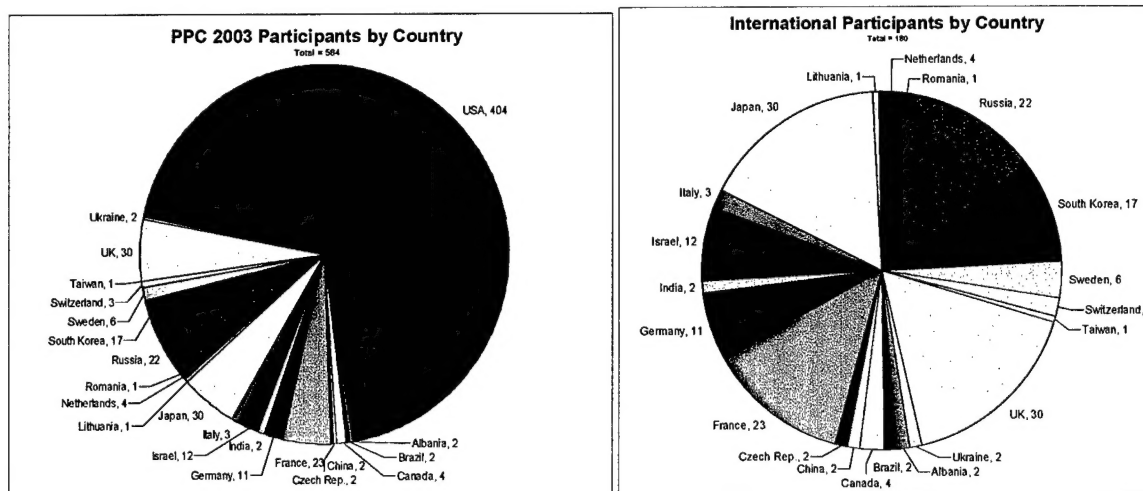
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The 14<sup>th</sup> IEEE International Pulsed Power Conference was held at the Hyatt Regency Hotel in Dallas June 15-18, 2003. 584 Participants from a total of 22 countries were in attendance, despite VISA problems and various travel advisories. Dr. Michael Giesselmann and Dr. Andreas Neuber, both from the Center for Pulsed Power & Power Electronics at Texas Tech University served as General and Technical Program Chair respectively. The conference featured several *first's* such as all electronic abstract and paper submission, all electronic paper presentation, an expanded and professionally managed industrial exposition and an internet café with wireless *hot-spots* in the conference area.



<http://dallasregency.hyatt.com/property/index.jhtml>

We received 477 abstracts using <http://www.webstracts.com> online services. Using the Website we conducted 1062 technical reviews; a first for the Pulsed Power Conference. Each of the working days of conference started with plenary sessions, followed by 4 breakout sessions in the morning, 4 more breakout sessions in the afternoon and a afternoon poster session.



The social program included a trip to the South-Fork Ranch, site of the famous "Dallas" TV-show. The conference started on Sunday with a welcoming reception and culminated on Tuesday evening with the formal Awards dinner. The Marx Award winner was Dr. Vladimir K. Chernyshev from the Russian Federal Nuclear Center – VNIIEF in Russia. Prof. Hidenori Akiyama from Kumamoto University in Japan won the Peter Haas Award. The student award winners for 2002/2003 were Thomas A. Holt from the Naval Research Laboratory and Gary Brent McHale from Texas Tech University.

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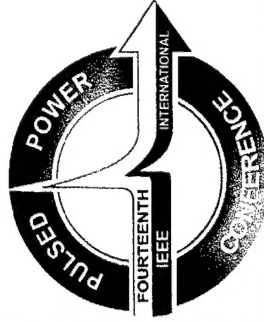
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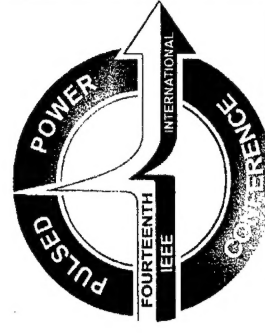
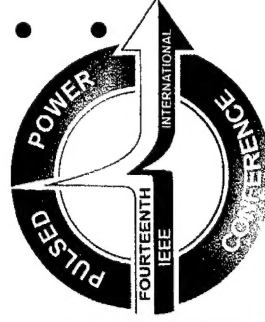
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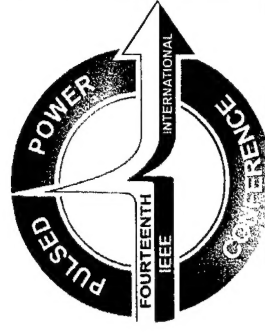
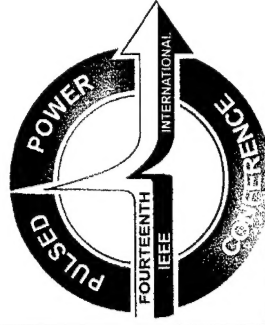
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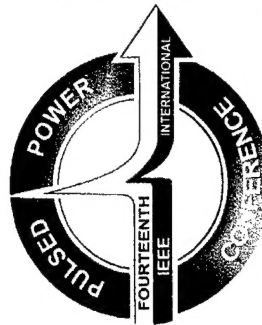
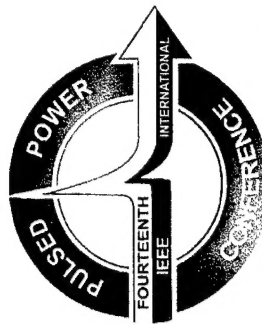




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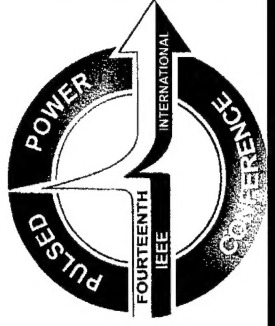
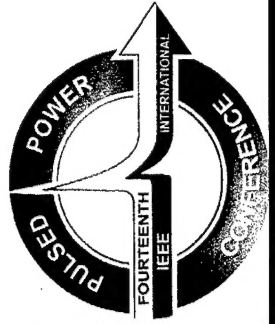
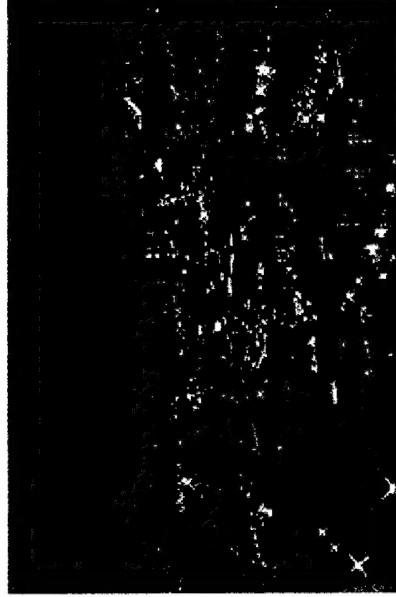
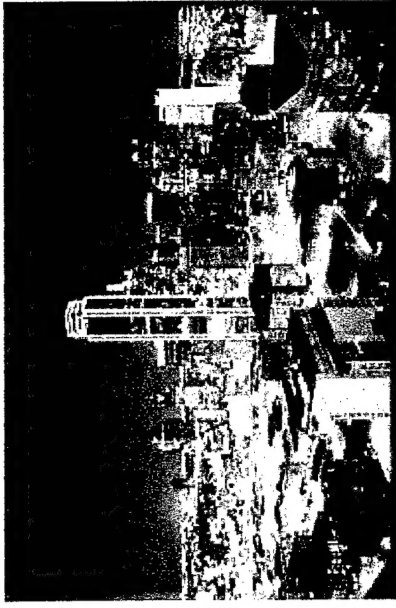
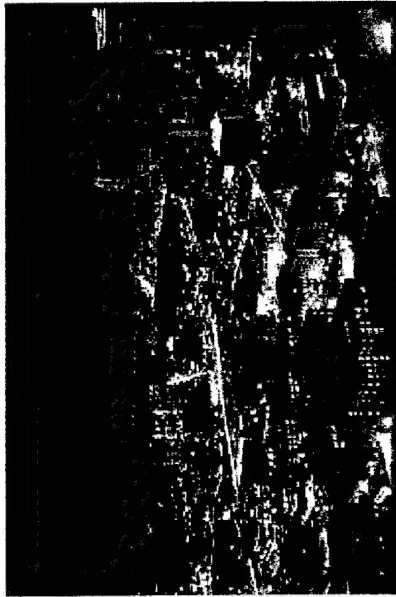


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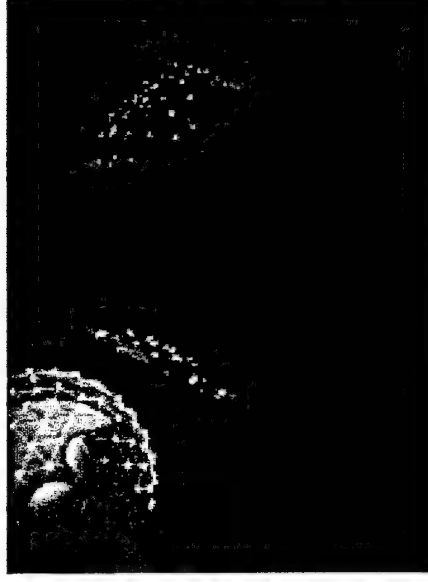
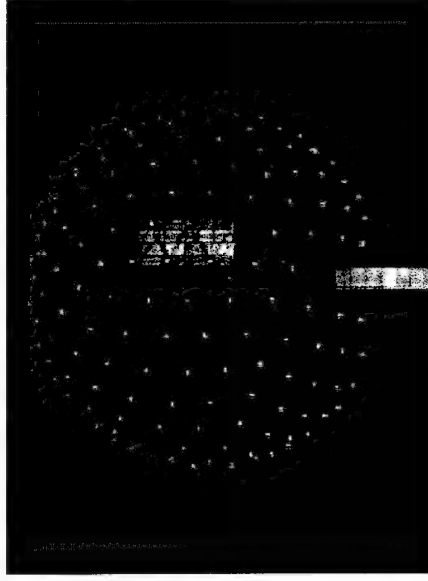
# Views of Dallas from the Hotel

Night Time views from the Reunion Tower



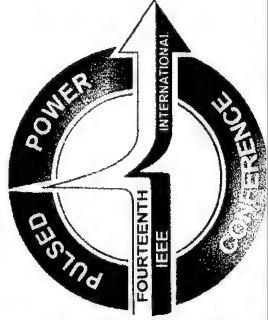


# Conference Location, Dallas Hyatt Regency Hotel at Reunion

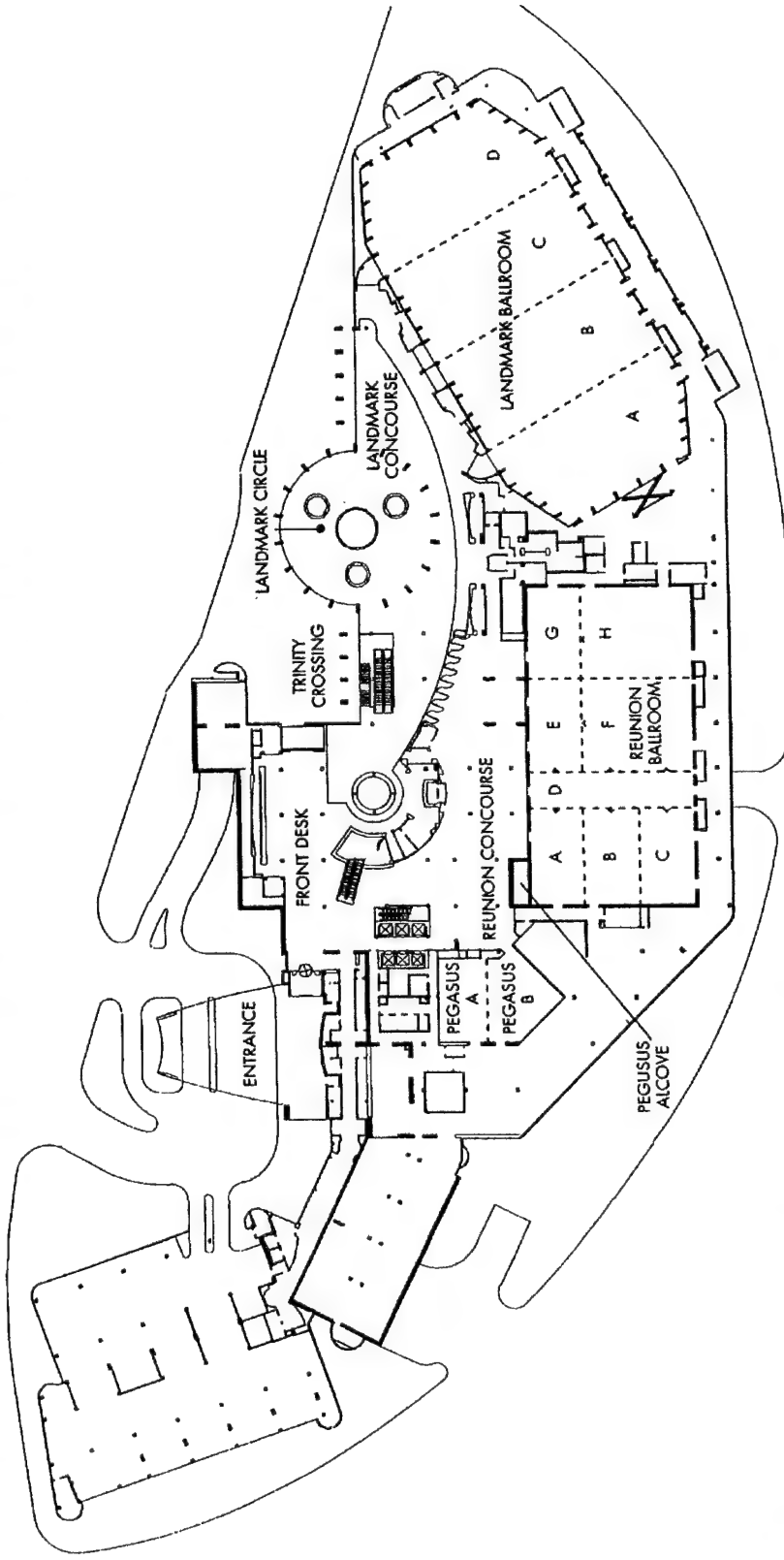


- **Reunion Tower**

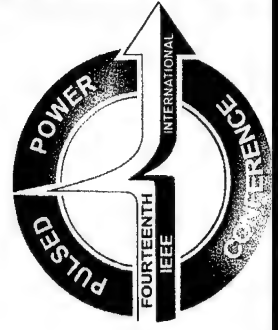
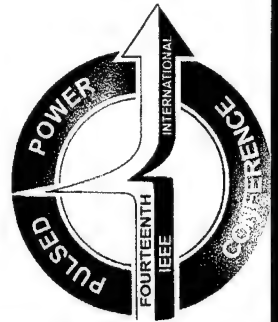
Built in 1978 at about 42 stories, this ornamental tower offers the best views of the city from 3 decks- observation, restaurant, and lounge. The lights on the dome oscillate in different patterns at night. It is the **most recognizable Dallas landmark.**



# Location of Conference Events



## lobby level



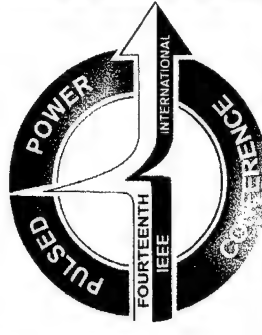
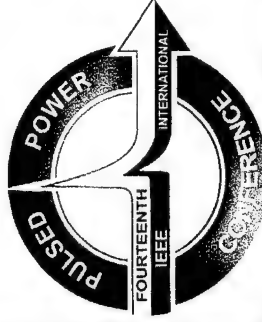
# PPC 2003 First's:

- **First** time all electronic paper submission
- **First** time large part of community takes part in paper review process (125 reviewers)
- **First** time electronic presentation
- **First** time Wireless "Cyber-Cafe" (802.11b), SSID

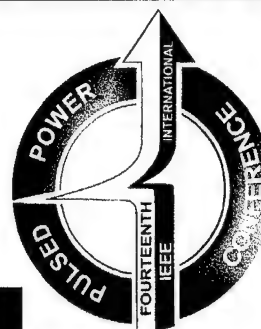
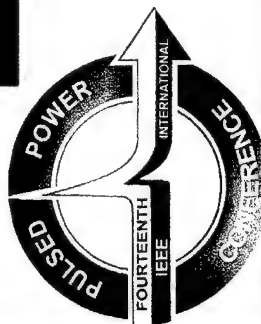
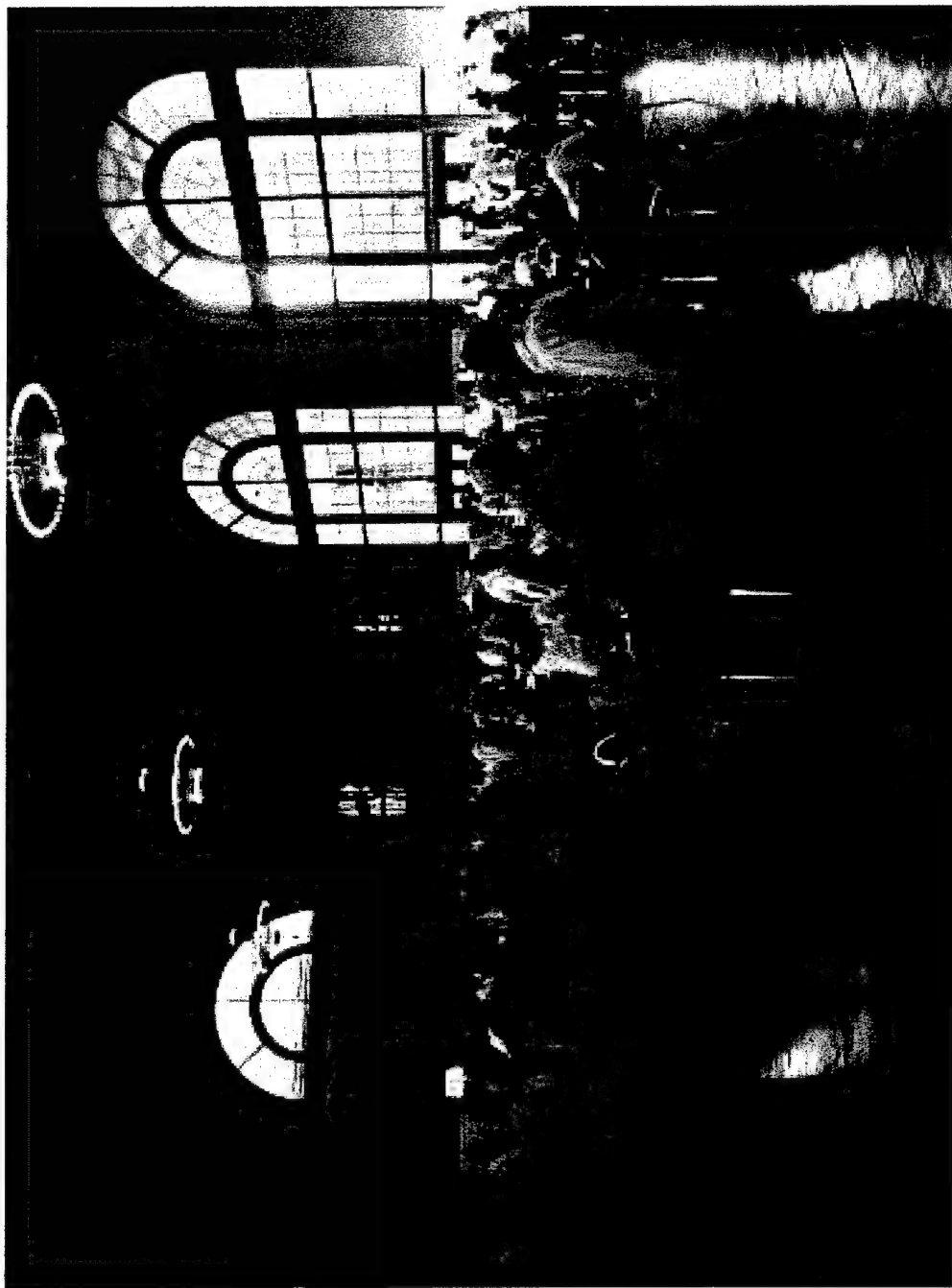
## PPC2003

### Other Enhancements:

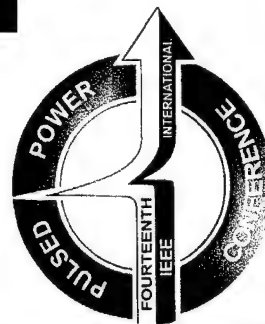
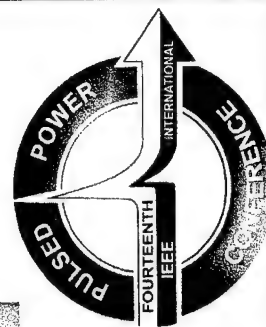
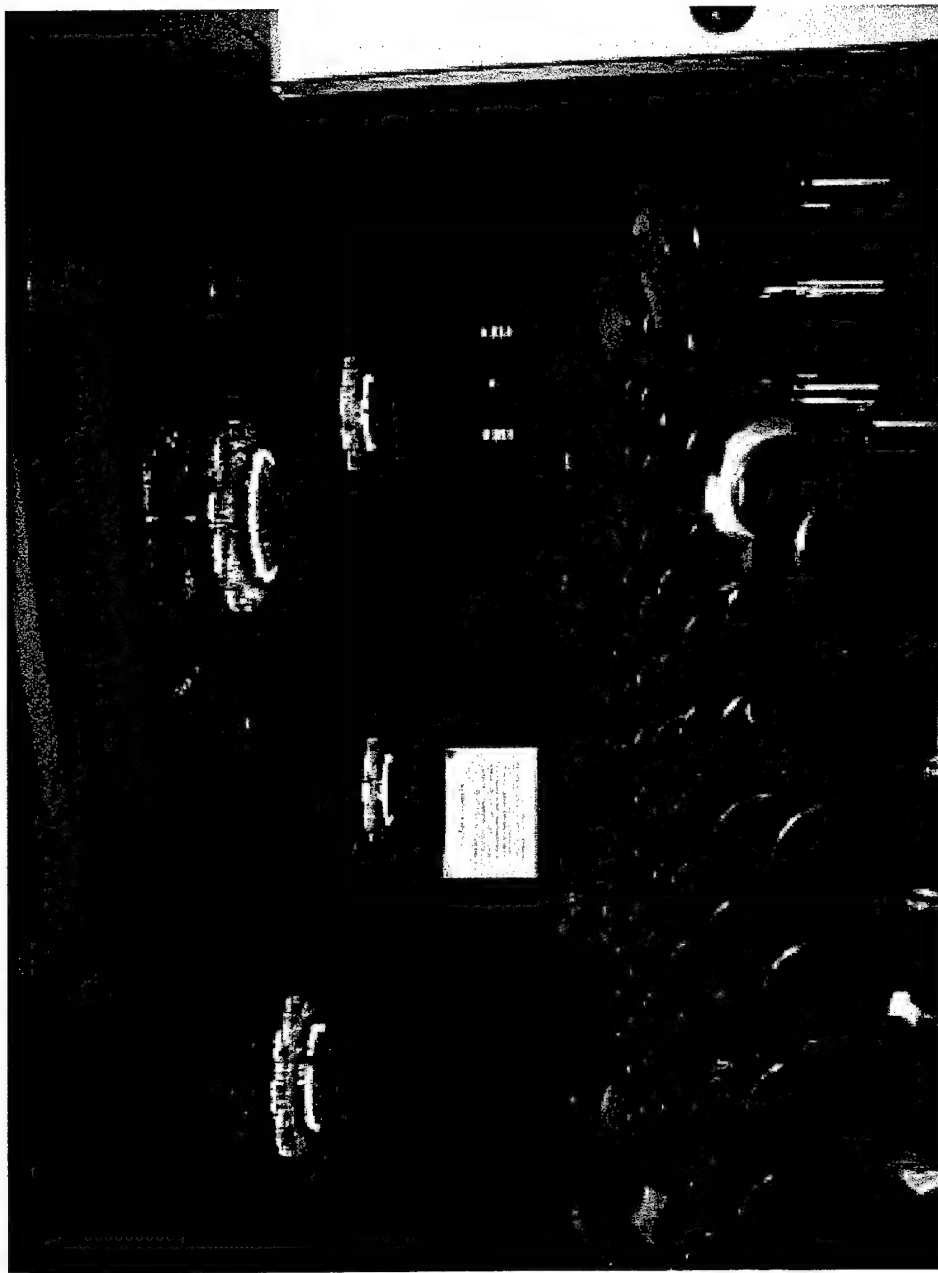
- Expanded and professionally organized Industrial Exhibition



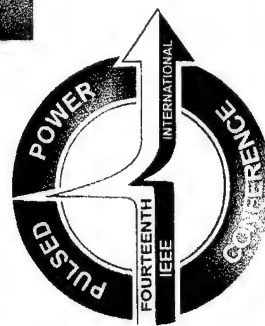
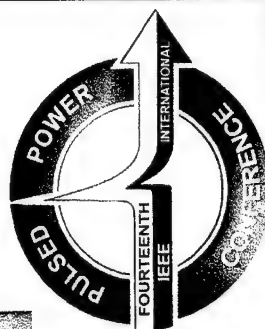
# Welcome Reception



# Plenary Lecture Room



# Breakout Session Room





# 14th IEEE International Pulsed Power Conference



**Dallas  
Texas, USA**

**June 15-18  
2003**



**IEEE  
PULSED  
POWER  
CONFERENCE**

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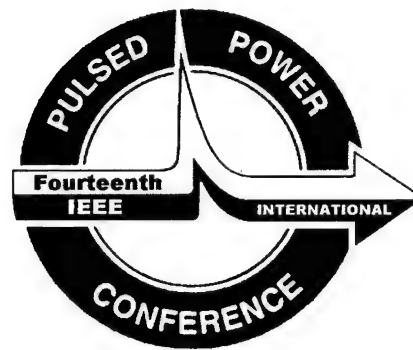
◆ **IEEE** Catalog Number: 03CH37472C ISBN: 0-7803-7916-0

Digest of Technical Papers

**PPC-2003**

**14<sup>TH</sup> IEEE INTERNATIONAL PULSED  
POWER CONFERENCE**

**Hyatt Regency Hotel  
Dallas, Texas USA  
June 15-18, 2003**



**Editors**

**Michael Giesselmann  
Texas Tech University  
Conference Chair**

**Andreas Neuber  
Texas Tech University  
Technical Program Chair**

## PREFACE

After a very successful and enjoyable conference, we are delighted to present the proceedings of the 2003 IEEE International Pulsed Power Conference (PPC 2003) to you. The conference was held in the Hyatt Regency Hotel in Dallas, Texas June 15-18, 2003 and had 584 registrants from 22 countries. 180 of the registrants were from outside the United States, despite serious visa problems for many scientists from countries with a traditionally large attendance, namely Russia. We would like to express our deep gratitude to all the talented members of the organizing committee for their hard work before, during and after the conference. A special thanks to DaLana Williamson, Birgit Green and Christine Crory, who served as Technical Program Secretary, Planning Director and Exhibits Coordinator respectively. We also would like to also thank all the sponsors of the conference for their generous support.

These proceedings present the collective description of the state of the art of pulsed power technology in the early part of the twenty-first century. We added considerable reference value to the proceedings through a web based peer review of the abstracts and papers, a first for the Pulsed Power Conference. We received a total of 477 abstracts and conducted 1062 technical reviews before the conference. This was made possible through a completely web-centric paper management. At this point, we like to extend a sincere thank you to Dave Pataky, who managed the web-site.

Another first for the Pulsed Power Conference was the use of computer projectors for all oral and plenary sessions, which greatly enhanced the presentation quality and experience for presenters and audiences alike. Also well liked by the conference participants was the Internet Café, which offered wired and wireless Internet access. PPC 2003 also featured an industrial exhibition, which was started at PPPS 2001 in Las Vegas. The exhibition was organized by professional planners and attracted a wide range of industrial participants for the mutual benefit of the exhibitors and conference attendees.

We are sure you also enjoyed the social program starting with the reception, the "night-out" to the South-Fork Ranch, and the formal awards dinner in the Ballroom at the Hyatt hotel. We hope these proceedings bring back good memories and be a useful reference for your work.

Yours Sincerely



---

Dr. Michael Giesselmann, P.E.  
General Conference Chair



---

Dr. Andreas Neuber, P.E.  
Technical Program Chair

# ERWIN MARX AWARD

**Dr. Vladimir K. Chernyshev**

Russian Federal Nuclear Center - VNIIEF,  
Russia



The origin of the **Erwin Marx Award** began at the 3<sup>rd</sup> IEEE Pulsed Power Conference (June 1981). The Erwin Marx Award was dedicated to the memory of Professor Marx and his concept of the cascade impulse voltage generator that bears his name. Professor Marx passed away on January 11, 1980, just prior to his 87<sup>th</sup> birthday. The High Voltage Institute of the Technical University of Braunschweig, has graciously allowed the Pulsed Power Conferences to present the Erwin Marx Award in his name. The Award is presented by Dr. Magne Kristiansen.

## **Biography of VLADIMIR K. CHERNYSHEV**

Vladimir Konstantinovich Chernyshev is the Deputy Scientific Leader of VNIIEF and the Chief Scientist of the Electro Physical Department of VNIIEF. He has been working at VNIIEF since 1950 after graduating with honors from the Moscow Engineering Physics Institute. In 1953 he was awarded the Stalin Prize.

In 1955 he was appointed the Head of the Scientific-Research Division. He proposed new ideas of drastic improvement of the HEPP systems being developed (Red Banner Order in 1956) and achieved their successful implementation (Lenin Order in 1960). He developed new principles of computational and physical modeling of new systems that provided the possibility not only to raise their efficiency and output characteristics but also to get a surprising stability of operation (Lenin award in 1962). He formulated the criterion required for detonation initiation in HE and the criterion of efficiency of electric circuits for safe detonators firing. That work resulted in the creation and application of safe detonators that in itself was the most important step in fundamental improvement of nuclear weapons safety. In addition, from the viewpoint of different experimental studies performed 40 years ago that put an end to all the accidents including those with fatal outcome.

Later he proposed and implemented a series of original ideas and inventions (fast energy delivery (1958) from the EMG circuit into the external load by opening the circuit, creation of disk EMG (1961), invention of a new way of magnetic flux generation, etc). In 1972 two groups of scientists, one of which headed by V.K. Chernyshev (another one by A.I. Pavlovskii) were awarded the Lenin Prize for a drastic improvement of magnetic cumulation (MC) systems proposed by A.D. Sakharov.

V.K. Chernyshev in close cooperation with the other VNIIEF scientists successfully developed powerful transportable neutron sources. V.K. Chernyshev has awarded the USSR State Prize (1980). Together with V.N. Mokhov and V.B. Yakubov V.K. Chernyshev proposed and substantiated an original idea for CTF problem solution (MAGO). Unique results were achieved in the field of liner physics V.K. Chernyshev is the author of more than 300 scientific works, 40 inventions and more than 100 papers in the area of HEPP. On the initiative and under the leadership of V.K. Chernyshev the first joint Russian-American (VNIIEF-LANL) and Russian-French experiments were conducted both in Russia, USA, Russia and France. Joint scientific activities with the largest foreign national laboratories have been successfully carried out under his leadership. V.K. Chernyshev is one of the outstanding VNIIEF scientists, the founder and the first developer of new scientific direction "Super-power explosive magnetic energy sources".

He is recognized as the leader in this field by the international scientific community and, first of all, by the scientists of the largest national laboratories like LANL, Philips (USA), CEA/DAM (France), CAEP (China) due to the fact that the achievements of the team headed by V.K. Chernyshev were at least 10 years ahead of their time, and in some research areas they have no alternatives and are even more ahead of time (for example, in magnitude of the energy generated and quickly transferred to the load (200 MJ, liner kinetic energy of 30 MJ).

His leadership provided the grounds for a scientific school founded and run by V.K. Chernyshev. In 1997 the Russian Fund of Fundamental Investigation recognized this school as the leading scientific school in Russia, and in 2000 this recognition was confirmed for the second time. The work was awarded the Russian Government Prize, 1998.

# PETER HAAS AWARD

**Prof. Hidenori Akiyama**

Kumamoto University, Japan



The **Peter Haas Award** was established at the 6<sup>th</sup> IEEE Pulsed Power Conference (June, 1987) and bears the name of the late Peter Haas who was recognized at the 2<sup>nd</sup> Pulse Power Conference (1979) "for many contributions to a strong and vigorous pulsed power program through sound management, steadfast conviction, and farsighted technical acumen." Today, the Peter Haas Award honors those individuals that share Peter's dedication, leadership, and vision for Pulsed Power. The award is presented by Dr. Magne Kristiansen.



## **Biography of HIDENORI AKIYAMA**

Professor Akiyama was born in Ehime, Japan and received his education in electrical engineering at the Kyushu Institute of Technology (BS, 1974), and Nagoya University (MS, 1976, PhD, 1979). He was a research associate at Nagoya University from 1979 to 1985, and then has been on the faculty of Kumamoto University since 1985, where he established a pulsed power laboratory. He has developed pulsed power generators based on the inductive energy storage system and repetitively operated pulsed power generators for industrial applications, for cleaning system of exhaust gases by pulsed streamer discharges in atmospheric pressure gases, cleaning system of lakes and marshes, sludge cleaning by producing a large volume discharge plasmas in water, and recycling systems of concrete and old computers. Recently, he is actively investigating extreme ultraviolet (EUV) sources for next generation semiconductor lithography, repetitively operated pulsed power generators with nanosecond pulse width, the application of pulsed power to biology, and the production of micro plasmas. His research program of pulsed power over wide fields was selected as one of the 21<sup>st</sup> century COE programs by the Japanese Government in 2003.

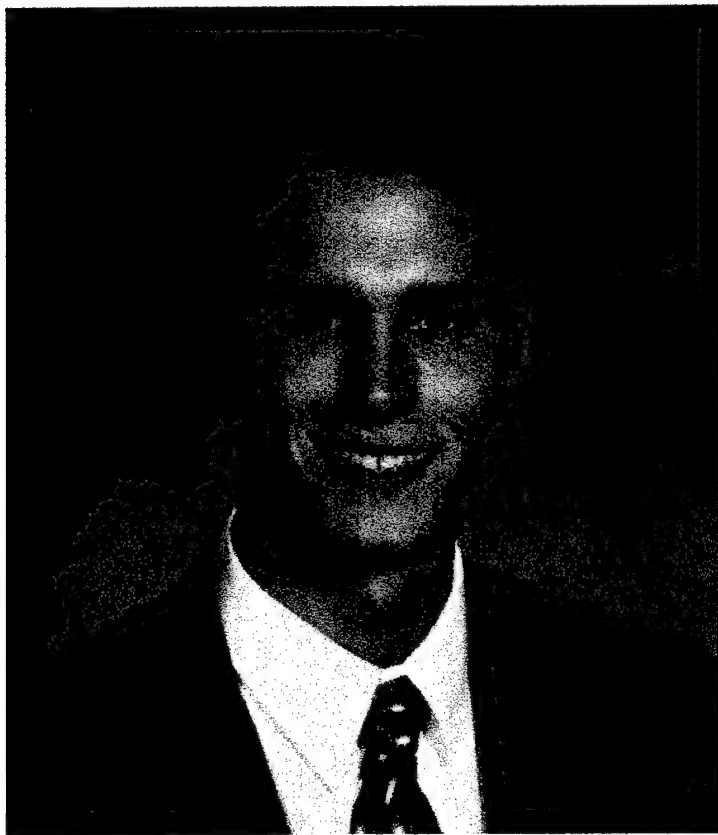
In addition to his many journal articles, the first text book of pulsed power in the world, a web pulsed power book\*, and editorships, professor Akiyama has trained over 290 senior students and 119 graduate students in the field of pulsed power technology. They are leading the pulsed power technology and the industrial applications in Japan. He has had a heavy involvement in collaborative research with numerous industrial companies. His efforts in the field of pulsed power have benefited organizations and colleagues around the world.

\* <http://education.eecs.kumamoto-u.ac.jp/PulsedPower/>

# **2002 PULSED POWER STUDENT AWARD**

**Thomas A. Holt**

Naval Research Laboratory



# **2003 PULSED POWER STUDENT AWARD**

**Gary Brent McHale**

Texas Tech University



## IN MEMORIAM



**Larry Lee Sanders**  
**1936 – 2003**

Larry Sanders was an internationally recognized, senior pulsed power technician for thirty-seven years. He died of cancer on the twenty-fifth of June 2003, in his home in San Lorenzo, California.

Born in Glenvel, Nebraska in 1936, Larry's formal training was in the U. S. Navy as an electronics technician (internal communications) and in nuclear power. He served on the fast attack nuclear submarine USS Swordfish, where he earned the rank of First Class Petty Officer.

Upon his discharge from the Navy, Larry joined Physics International. He learned the technology quickly and was rapidly promoted to supervisory positions gaining his first external recognition for technical excellence as the operations supervisor for the USAF B<sup>3</sup> Facility (Big Blue Boy, a Pulserad 1150) at Physics International. He was the Lead Technician responsible for installing and checking-out the Aurora machine at the U. S. Army Harry Diamond Laboratory, Adelphi, Maryland – the largest (1.5 million gallons of transformer oil), most powerful (20 TW), first-generation super-power flash x-ray machine. Larry's first international machine was Grec (Pulserad 1480), a very large flash radiographic machine at Le Centre d'Études de Gramat (CEG), Gramat, France. His second was the Modular Bremsstrahlung Source (Pulserad 115W), also at CEG. After several years of supervising operations and development on a number of state-of-the-art pulsed power machines at Physics International, Larry installed and checked-out the Phoenix machine at Naval Surface Weapons Center, White Oak, Maryland.

Larry's forte was large, high-voltage, single-pulse systems, but he was also instrumental in installing and checking-out three large, "gun" banks - the 4.5-MJ General Dynamics Land Systems electro-thermal-chemical bank in West Virginia; the 32-MJ Royal Armament Research and Development Establishment electromagnetic launcher bank in Kirkcudbright, Scotland; and the 30-MJ Technische Zentrum Nord electromagnetic launcher/electro-thermal-chemical bank in Unterlüß, Germany. For the last decade, Larry worked on the Decade machine for the Arnold Engineering Development Center, Arnold AFB, Tennessee. Larry was the Lead Technician for all factory testing as well as for installation and check-out in Tennessee.

In addition to his consummate skill, Larry was renown for his hard work, stamina, and ability to place very large equipment precisely where it belongs. He will be sorely missed by his colleagues at Physics International, Maxwell Physics International, and Titan Pulse Sciences, and by his customers at various laboratories in the United States, United Kingdom, France, and Germany.

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## LIST OF TECHNICAL TOPICS AND TOPIC/SESSION ORGANIZERS

<u>Topic</u>	<u>Organizer/Affiliation</u>	<u>Email</u>
Lasers	Mark Newton <i>Lawrence Livermore Nat'l Lab</i>	newton6@llnl.gov
Closing & Opening Switches	Richard Ness <i>CYMER, Inc.</i>	rness@cymer.com
High Power Microwaves	Diana Loree <i>Air Force Research Lab/DEHA</i>	Diana.Loree@kirtland.af.mil
Computational Techniques	Greg Engel <i>University of Missouri</i>	EngelT@missouri.edu
Electric Armaments	Thomas Weise <i>Rheinmetall W&amp;M</i>	Thomas.Weise@Rheinmetall-Wm.Com
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Compact Pulsed Power	William Carey <i>ARC Technology</i>	carey@arc-tech.us
Repetitive Pulsed Power Systems	Michael Barnes <i>TRIUMF</i>	barnes@triumf.ca
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Pulsed Power Applications II	Steven Pronko <i>Archimedes Technology</i>	spronko@atgsd.com
Diagnostics	Greg Engel <i>University of Missouri</i>	EngelT@missouri.edu
Radiation Sources	Richard Gullickson <i>DTRA</i>	Richard.Gullickson@dtra.mil
Explosive-Driven Pulsed Power	Bucur Novac <i>Loughborough University</i>	B.M.Novac@lboro.ac.uk
Hydrodynamic Experiments	Gerald Kiuttu <i>Air Force Research Lab</i>	Gerald.kiuttu@kirtland.af.mil
High Current Accelerators, Particle Beams I	Bruce Weber <i>Navy Research Lab</i>	weber@suzie.nrl.navy.mil
High Current Accelerators, Particle Beams II	Michael G. Mazarakis <i>Sandia National Lab</i>	mgmazar@sandia.gov
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Generators & Networks	Michael Barnes <i>TRIUMF</i>	barnes@triumf.ca
Insulation & Dielectric Breakdown	John Mankowski <i>Texas Tech University</i>	j.mankowski@coe.ttu.edu
Pulsed MHD Generators	Rickey Faehl <i>Los Alamos National Lab</i>	rjf@lanl.gov
Poster Sessions	Frank Hegeler <i>Navy Research Lab/CTI</i>	fhegeler@this.nrl.navy.mil

# TOPICS STATISTICS BY COUNTRY

	Australia	Brazil	Canada	Chile	China	Czech Republic	England	France	Germany	India	Israel	Japan	Korea	Lithuania	Netherlands	Romania	Russia	Sweden	Switzerland	Turkey	UK	Ukraine	USA	Yugoslavia	Total
Lasers								2	2			1					1						2		6
Solid State Switches					1		1	1	2	1							3		1				16		26
Closing & Opening Switches					2					1	1		3		1		17						12		37
Pulse Power Applications					1				3	1	2	14	4		1	1	9				2	1	20		59
High Power Microwaves		2			2				2	1	2	2	4				5				1		7		26
Diagnostics					1						2			1			2						4		10
Computational Techniques					1												4				2		8		15
Radiation Sources				1	1	1		1	1		2						9				6		11		33
Inertial Power Generation																							1		1
Explosive-Driven Pulsed Power					2												15				1		13		31
Electric Armaments													2									3	2		7
Hydrodynamic Experiments																	1						5		6
Components for Pulsed Power					2			1			1						2		1		2		15		24
High Current Accelerators					1			2							1		6				2		42		54
Particle Beams											2	2	3				3			1	1	1	22		35
Biological/Medical Applications					2	1					1	2	3		1		3				1		7		21
Compact Pulsed Power	1				1			2	3		1	2					1	2			1		18		32
Generators & Networks					1			1			1								1		1		6		12
Repetitive Pulsed Power Systems		1	2						3			2	2				2						9		21
Insulation & Dielectric Breakdown							1										2						1		3
Pulsed MHD Generators												2											12		19
Totals for PPC 2003	1	3	2	1	18	2	2	10	14	4	13	27	21	1	4	1	85	2	3	1	20	7	232	3	477

## Plenary Presentations

“ON THE ROAD TO COMPACT PULSED POWER: ADVENTURES IN MATERIALS, ELECTROMAGNETIC MODELING, AND THERMAL MANAGEMENT”

Edi Schamiloglu, *University of New Mexico, USA*

Karl Schoenbach, *Old Dominion University, USA*

Robert Vidmar, *University of Nevada, USA*

“COMPACT, PORTABLE PULSED POWER: PHYSICS AND APPLICATIONS”

Martin Gundersen, *University of Southern California, USA*

James Dickens, *Texas Tech University, USA*

William Nunnally, *University of Missouri – Columbia, USA*

“ELECTROMAGNETIC LAUNCH TECHNOLOGY COMES OF AGE” \*

Harry Fair, Ian McNab, Mark Crawford

*Institute for Advanced Technology, The University of Texas at Austin*

“Z REFURBISHMENT AND THE PATH TO HIGH YIELD AT SANDIA NATIONAL LABORATORIES” \*

Dillon McDaniel

*Sandia National Laboratories, USA*

“THE ROLE OF PULSED POWER IN INTERNATIONAL SECURITY AND COUNTERTERRORISM”

Hugh Kirbie

*Los Alamos National Laboratory, USA*

“STATUS OF THE DIODE RESEARCH PROGRAMME AT AWE”

John O'Malley

*AWE Aldermaston, UK*

“PULSED-POWER APPLICATIONS TO MATERIALS SCIENCE”

Kiyoshi Yatsui, Weihua Jiang, Hisayuki Suematsu, Tsuneo Suzuki, Makoto Hirai

*Extreme Energy Density Research Institute,, Nagaoka University of Technology, Japan*

\* Publication not presented in this proceedings

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